

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT
CAPSULE INTEGRITY ASSESSMENT METHOD FOR WESF

Identification No.: RL-DD041

Date: October 2001

Program: Waste Management

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-CP02

Waste Stream: 2115 – Cs/Sr Capsules

TSD Title: TBD

Operable Unit (if applicable): N/A

Waste Management Unit (if applicable): N/A

Facility: Waste Encapsulation Storage Facility (WESF)

Priority Rating:

This entry addresses the “Accelerated Cleanup: Paths to Closure (ACPC)” Priority:

- ☐ 1. Critical to the success of the ACPC.
- ☒ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays).
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Capsule Integrity Assessment Method for WESF.

Need/Opportunity Category: *Technology Need* -- There is no existing or currently identified technology capable of solving the Site’s problem (i.e., technology gap exists, no baseline approach has been identified).

Need Description: The Waste Encapsulation and Storage Facility (WESF) stores approximately one-third of the total curies of the Hanford Site’s radioactive material in the form of cesium and strontium capsules. Approximately 68 million curies of cesium-137 and strontium-90 by-product are contained in the 1,936 capsules presently stored in the WESF basins under 13 feet of deionized water. There is need for an improved method to determine capsule integrity to reduce the risk of a leak occurring. (There also is a separate need for an effective monitoring system to identify a leaking capsule should a leak actually occur. This need is presented in RL-DD01.)

New technology would better assess the integrity of the WESF capsules. The technology/method would increase the technical basis for assessing the structural integrity of the inner

container. Monitoring the capsule integrity over the next 20 years is required to ensure worker safety and safety to the public and the environment.

Schedule Requirements:

Earliest Date Required: ASAP

Latest Date Required: (10/01/17)

This technology could be deployed immediately. The current baseline for the WESF facility is to continue storing capsules until their final removal in 2017. Deactivation activities would begin soon thereafter. Note: A change request is currently pending that would delay the 2017 date until the end of FY 2022.

Problem Description: WESF stores strontium and cesium capsules in pool cells that were constructed to provide shielding and cooling for approximately 1,900 capsules. There are 6 pool cells that are actively storing capsules, each measuring approximately 4.5 ft x 20 ft x13 ft (deep).

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation:

No cost saving is projected.

Benefit to the Project Baseline of Filling Need: Reduced risk of storage basin contamination.

Relevant PBS Milestone: N/A

Functional Performance Requirements: The technology and method should allow for an underwater , and non-invasive assessment of the individual capsules (approximately 1,900 capsules are stored in 5 pools) to detect failure, either in the form of corrosion of the inner capsule or the presence of salt in the annulus. The underwater depth is 13 feet. The capsules cannot be lifted more than 30 inches from the bottom of the pool. This technology must be operable in a high radiation environment. The exposure rate of a single submerged cesium capsule, which contains 50 kilocuries is 200 rems per second at contact and 11 rems per second at 24 inches.

Work Breakdown

TIP No.:

Structure (WBS) No.:

1.4- WESF Sub-Project

Candidate

Justification For Need:

Technical: Rapid identification of reduced capsule integrity would help to identify problems before onset of a leak. Ideally, this would minimize pool cell contamination and the need for subsequent pool cell cleanup. A successful technology could significantly reduce worker exposure and eliminate the man-hours spent on the regularly scheduled clunk tests.

Regulatory: WESF is under interim status with a Part A permit for miscellaneous storage of containers. The inner capsule is considered to be the container and as such must be inspected weekly for degradation of integrity. WAC 173-303-630(6).

Environmental Safety & Health: Worker safety would be improved by the provision of an improved capsule integrity assessment technology and method. Early leak detection would minimize the risk of worker exposure for pool cell decontamination.

Cultural/Stakeholder Concerns: Early indications of reduced capsule integrity would reduce the risk of employee exposure that could eventually result from an unexpected release of toxic and/or radioactive materials and it would reduce the quantities of materials handled, stored, or disposed of as a secondary waste product.

Other: None identified.

Current Baseline Technology: The ability to detect radioactive material in the capsule

End-User: EM-60.

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